

CLAIMS

What is claimed is:

1. An automatic vehicle exterior light control system, comprising:
a controller configured to generate an exterior light control signal as a function of the presents of an atmospheric condition of interest, wherein said controller is further configured to distinguish between reflections off of a highly reflective surface and reflections off of atmospheric conditions of interest.
2. An automatic vehicle exterior light control system as in claim 1 wherein said highly reflective surface is selected from the group comprising: an at least partially wet road, an at least partially snow covered road, an at least partially ice covered road, a surface of a snow pile along a road, and a surface of an at least partially snow covered road side.
3. An automatic vehicle exterior light control system as in claim 1 wherein said atmospheric condition of interest is selected from the group comprising: fog, mist, snow, sleet, hail, rain, steam, smoke and dust.
4. An automatic vehicle exterior light control system as in claim 3 wherein said highly reflective surface is selected from the group comprising: an at least partially wet road, an at least partially snow covered road, an at least partially ice covered road, a surface of a snow pile along a road, and a surface of an at least partially snow covered road side.
5. An automatic vehicle exterior light control system as in claim 1 wherein said reflections are identified by employing at least one of the parameters selected from the group comprising: mean grayscale value of at least a portion of at least one image, total grayscale value of at least a portion of at least one image, average grayscale value of at

least a portion of at least one image, slope of pixel column location versus pixel grayscale value of at least a portion of a column of pixels within at least one image, slope of pixel row location versus pixel grayscale value of at least a portion of a column of pixels within at least one image, intercept of pixel column location versus pixel grayscale value of at least a portion of a column of pixels within at least one image, slope of pixel row location versus pixel grayscale value of at least a portion of a column of pixels within at least one image, a coefficient of determination, parabolic fit of at least a portion of column pixel value averages in at least one image, multiple images of differing exposure times, inputs from vehicle pitch sensors, a low-pass filter applied to at least a portion of an image, gradual vertical cutoff in at least a portion of pixel rows within at least one image, row average grayscale value net increase moving downward in at least one image, white-to-red ratio of at least one pixel in at least one white image and at least one pixel in at least one red spectral filtered image, sum of average grayscale values for at least one row in at least one image, increase brightness of controlled vehicle's exterior light and detect increase in reflection, at least one probability function, and at least one neural network.

6. An automatic vehicle exterior light control system as in claim 1 wherein said controller is further configured to manipulate one of the items selected from the group comprising: an exterior light adjustment rate, an image analysis parameter, a sensitivity parameter, fog light signal, taillight brightness, a field of view parameter, a spectral filter parameter, an algorithm parameter, an algorithm activation, an algorithm deactivation, an exterior light maximum brightness limit, and an exterior light minimum brightness limit as a function of detected reflections.

7. An automatic vehicle control system, comprising:
a controller configured to effect automatic operation as a function of an ambient light value, wherein said ambient light value is a weighted average of a plurality of ambient light level readings acquired from a photo transducer.

8. An automatic vehicle control system as in claim 7 wherein said ambient light value is an exponential, time-weighted, average value.
9. An automatic vehicle control system as in claim 7 wherein automatic operation of an automatic vehicle exterior light control system is enabled.
10. An automatic vehicle control system as in claim 9 wherein automatic operation is disabled at an ambient light value level higher than the level at which automatic operation is enabled.
11. An automatic vehicle control system as in claim 7 wherein automatic operation of an automatic vehicle exterior light control system is disabled.
12. An automatic vehicle control system as in claim 11 wherein automatic operation is enabled at an ambient light value level lower than the level at which automatic operation is disabled.
13. An automatic vehicle control system as in claim 7 wherein automatic operation of an electro-optic mirror control system is enabled.
14. An automatic vehicle control system as in claim 13 wherein automatic operation is disabled at an ambient light value level higher than the level at which automatic operation is enabled.
15. An automatic vehicle control system as in claim 7 wherein automatic operation of an electro-optic mirror control system is disabled.
16. An automatic vehicle control system as in claim 15 wherein automatic operation is enabled at an ambient light value level lower than the level at which automatic operation is disabled.

17. An automatic vehicle exterior light control system, comprising:

a controller configured to identify the source of a reflection in an image by employing at least one of the parameters selected from the group comprising: mean grayscale value of at least a portion of at least one image, total grayscale value of at least a portion of at least one image, average grayscale value of at least a portion of at least one image, slope of pixel column location versus pixel grayscale value of at least a portion of a column of pixels within at least one image, slope of pixel row location versus pixel grayscale value of at least a portion of a column of pixels within at least one image, intercept of pixel column location versus pixel grayscale value of at least a portion of a column of pixels within at least one image, slope of pixel row location versus pixel grayscale value of at least a portion of a column of pixels within at least one image, a coefficient of determination, parabolic fit of at least a portion of column pixel value averages in at least one image, multiple images of differing exposure times, inputs from vehicle pitch sensors, a low-pass filter applied to at least a portion of an image, gradual vertical cutoff in at least a portion of pixel rows within at least one image, row average grayscale value net increase moving downward in at least one image, white-to-red ratio of at least one pixel in at least one white image and at least one pixel in at least one red spectral filtered image, sum of average grayscale values for at least one row in at least one image, increase brightness of controlled vehicle's exterior light and detect increase in reflection, at least one probability function, and at least one neural network.

18. An automatic vehicle exterior light control system as in claim 17 wherein said controller is further configured to manipulate one of the items selected from the group comprising: an exterior light adjustment rate, an image analysis parameter, a sensitivity parameter, fog light signal, taillight brightness, a field of view parameter, a spectral filter parameter, an algorithm parameter, an algorithm activation, an algorithm deactivation, an exterior light maximum brightness limit, and an exterior light minimum brightness limit as a function of detected reflections.

19. An automatic vehicle control system, comprising:
a controller configured to detect an inoperable image sensor, wherein said inoperability is determined by employing at least one of the factors selected from the group comprising: no lights in a series of images over a period of time, comparing at least one image acquired from a first image sensor with at least one image acquired from a second image sensor, and analysis of light rays emitted from a supplemental light source, detection of reflections from a road surface resulting from at least one exterior light of a controlled vehicle.
20. An automatic vehicle control system as in claim 19 wherein the inoperability of said image sensor is due to at least one of the factors selected from the group comprising: a blocked image sensor and a faulty image sensor.
21. An automatic vehicle control system as in claim 19 wherein at least one vehicle system selected from the group comprising: a system to detect obstacles, a lane change warning system, an adaptive cruise control system, a supplemental rear vision system, a moisture sensor system, and a collision avoidance system has its operation influenced by said inoperability.
22. An automatic vehicle control system as in claim 19 further comprising a warning indicator for an operator of a controlled vehicle to indicate image sensor inoperability.
23. An automatic vehicle exterior light control system, comprising:
a controller configured to detect at least one of a pedestrian and a bicyclist and further configured to provide a corresponding indication to an operator of a controlled vehicle.
24. An automatic vehicle exterior light control system as in claim 23 further configured to disable automatic operation of at least one high beam headlight in response to an operator activated input device.